MATTER

Everything in the world is made of something called matter. Matter can exist in three different states: solids, liquids, and gases. All matter, regardless of its state, has two important properties:

a. The first property is that matter has mass.
b. The second property is that matter takes up space.

Matter is anything that has mass and takes up space. It consists of subatomic particles, atoms, ions, and compounds. Sometimes these particles are tightly bound and close together, while other times particles are loosely connected and widely separated. States of matter describe the qualities displayed by matter. Basically, the state of matter of a substance depends on how much energy its particles have. We can change the energy of matter by altering its temperature or pressure, causing matter to transition from one state to another. But, when matter changes state, its chemical identity remains the same. So, if you take ice, melt it, and then boil it, its state of matter changes, but it's always water. These things come in different shapes, sizes, and colours, but they all have something in common: they have mass and they occupy space.

States of Matter and their Properties

1. SOLIDS

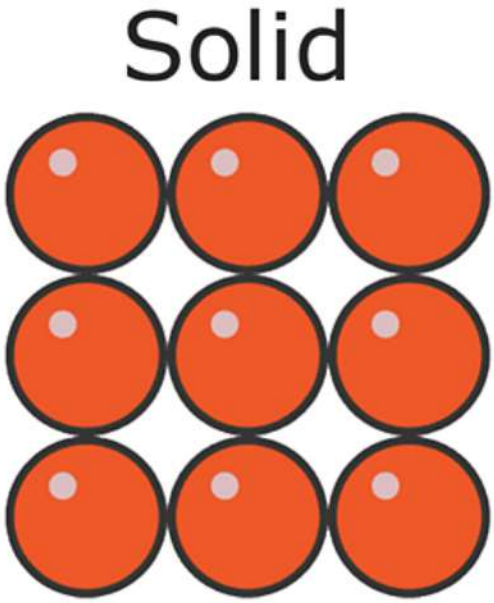
a) Solids are things that have a fixed shape and a fixed size.

b) The tiny particles, called molecules, are packed tightly together in solids.

c) When you move a solid from one container to another, it keeps its shape and doesn't change.

d) Solids do not flow like liquids, and you can't squish them or press them down to make them smaller.

e) Examples of solids are things like wooden desks, rocks, books, toys, chairs, and plates.



2. LIQUIDS

a) Liquids do not have a fixed shape. They can take the shape of the container they are poured into.

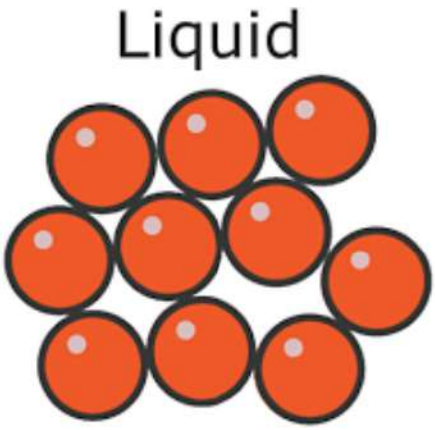
b) Liquids have a definite volume. Even though their shape may change, the amount of liquid remains the same.

c) Unlike solids, liquids can move and flow.

d) Liquids are difficult to compress. While they can be compressed slightly, the change in volume is usually very small and not easily noticeable.

e) The molecules in liquids are loosely packed. They are not as tightly arranged as solids. This allows them to move around and flow more freely.

f) Water, soda, ink, juice, and milk are a few examples of liquids.



3. GASES

a) Gases don't have a fixed shape. They can spread out and take up all the space available to them.

b) Gases also don't have a definite volume. This means they can expand or contract depending on the conditions.

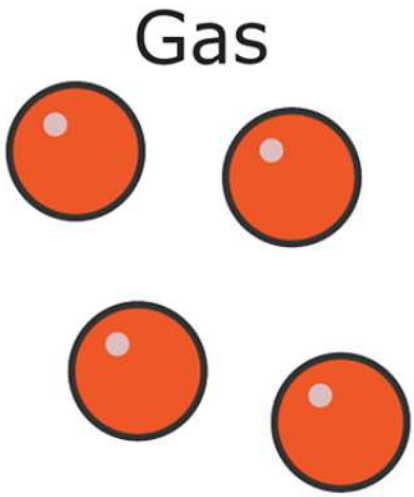
c) Gases can be squished or compressed.

d) Gases flow easily, just like liquids. They can move around and mix with other gases.

e) The molecules in gases are spread out and far apart from each other. They have lots of space to move around.

f) Unlike solids and liquids, most gases cannot be seen with our eyes. They are invisible. You can't see oxygen or carbon dioxide, but they're all around us.

g) Examples of gases include water vapour, carbon dioxide, oxygen and nitrogen



Changes in the States of Matter

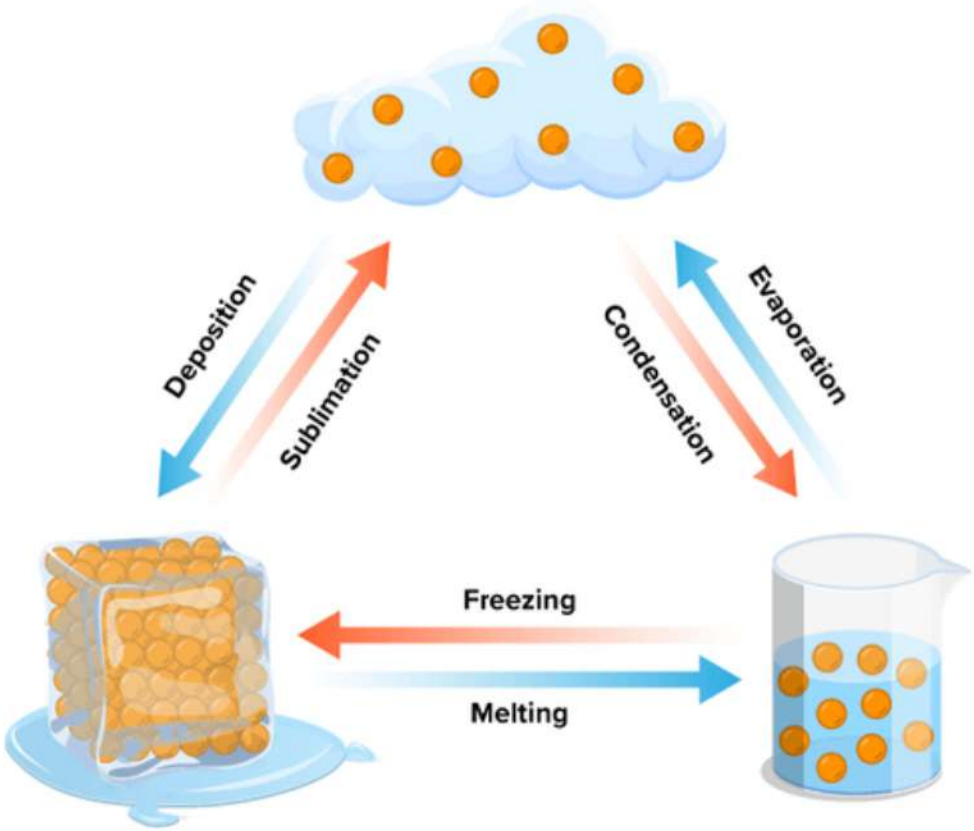
a) Matter can be found in different forms called states. These states are solids, liquids, and gases.

b) When we heat or cool matter, it can change from one state to another. This is called a change of state, and it's a physical change, not a chemical one. It means the matter can go back to its original state.

c) There are some common changes of state that we see.

For example, when something solid like ice melts, it turns into a liquid, which is water. And when we cool down water, it can freeze and become ice again. Another change is when water vapour, which is gas, cools down and becomes a liquid, which we call condensation. And when we heat up liquid water, it can change into water vapour, which is a gas.

d) Water can exist in all three states: as a liquid, a solid (ice), and a gas (water vapour).



Effects of Heating or Cooling on Particles of Matter

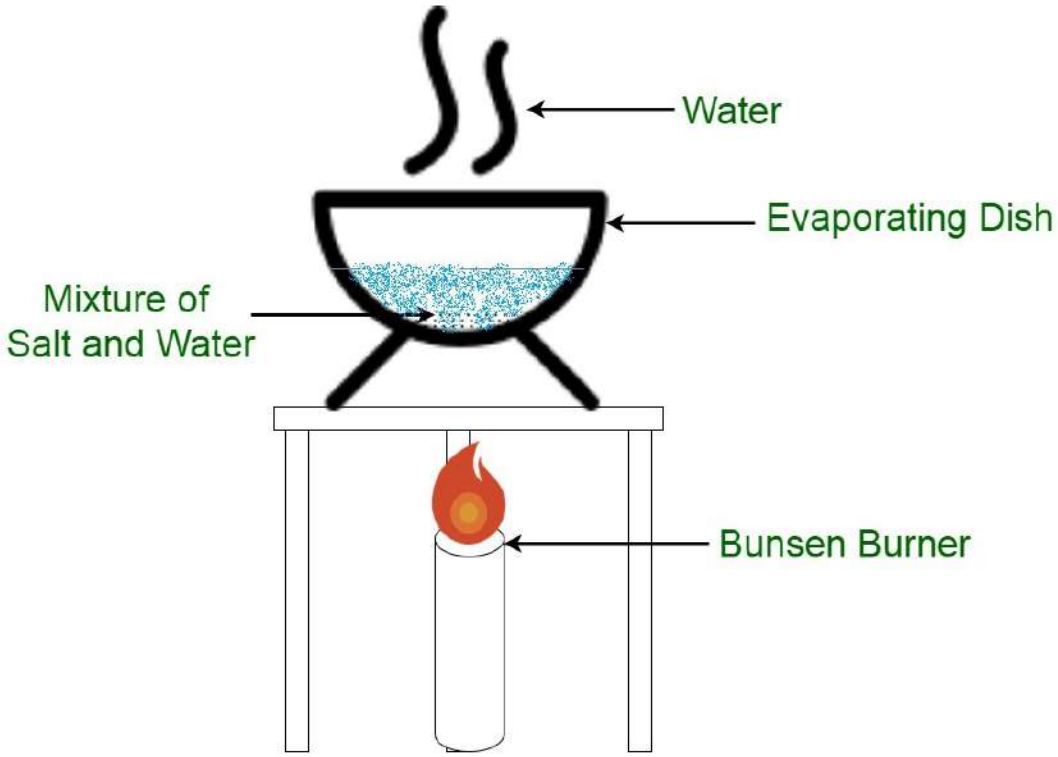
1. When we heat or cool matter, it affects how the particles in it move.

2. Heating makes the particles move faster.

3. But when we cool the matter, the particles slow down their movement.

Evaporation

Evaporation is when water turns into an invisible gas called water vapour because of the heat.

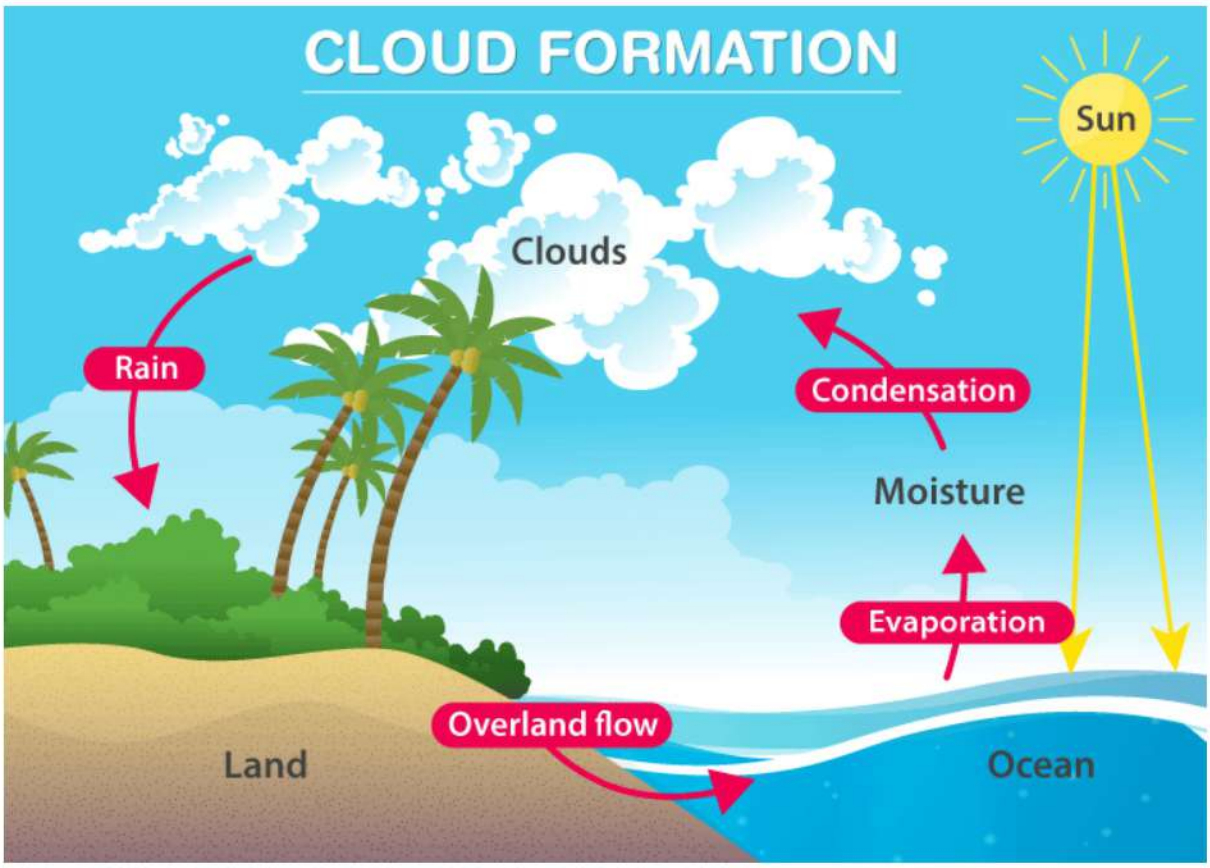


We can observe this in our everyday life also such as:

- Hot tea getting, cold.
- Wet clothes drying in the sun.
- Evaporation of perspiration from the body.
- Drying of a mopped floor.
- Drying of wet hair.

Condensation

Condensation is a process that happens when a gas turns into a liquid. A very common example of condensation is when you leave a cold glass of water outside on a warm day. You might notice water droplets forming on the outside of the glass. This happens because the air around the glass is warmer, and when it comes in contact with the cold glass, it cools down and turns into liquid water. Condensation is an important part of the water cycle. It's how clouds are formed in the sky.



Freezing

Freezing is a process that happens when a liquid gets really cold and turns into a solid. It's like when you put a cup of water in the freezer, and it becomes a hard block of ice.

Melting

Melting is a process that happens when something solid, like ice, gets warm and turns into a liquid, like water. For example, when you hold a few ice cubes in a vessel after a few minutes they become water.

Melting happens not only with ice but also with other solids like chocolate or butter. When temperature increases or they are heated, they melt and become liquid.

Types of Change in Matter

Two types of changes can happen to matter: physical changes and chemical changes.

1. Physical Change

a) When the substance changes its appearance or shape, but its identity stays the same then we consider it as a physical change process

b) It's like when you cut a piece of paper into smaller pieces or fold it into a different shape. The paper looks different, but it's still paper.

c) Another example is when you freeze water to make ice cubes. The water changes from a liquid to a solid, but it's still water.

d) Physical changes are usually reversible, which means you can change it back to its original form. It may include any of the following changes,

1. Change of state
2. Change of texture
3. Change of temperature
4. Change of colour
5. Change in shape

Examples of Physical Change

Melting ice

Boling water

Breaking glass

Chopping wood

Folding paper

Breaking egg

2. Chemical Change

a) Chemical changes happen when substances combine or break apart to form new substances with different properties.

b) It's like when something changes into a completely different thing.

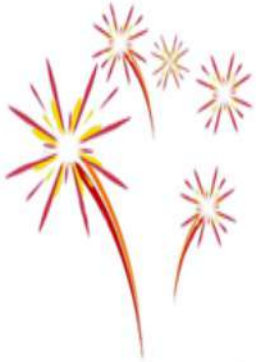
c) For example, when paper burns, it turns into ashes, which are completely different from the original paper.

d) Other examples of chemical changes include the ripening of a banana, baking a cake, or cooking vegetables.

e) Once a chemical change happens, it cannot be easily reversed. Signs of chemical changes include,

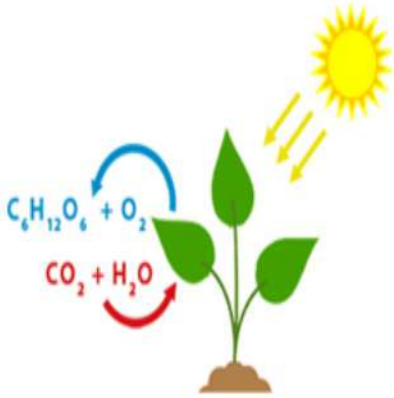
1. Change of temperature
2. Change of odour
3. Change in colour
4. Formation of any precipitates or bubbles

Examples of Chemical Change



Fireworks

Frying eggs



Photosynthesis

Burning wood

Combustion of propane

Digestion